

Elementary Education Newsletter



This issue of the *Elementary Education Newsletter* is the second issue which addresses the curriculum and instruction component of *Elementary Makes the Grade!* The October issue of the newsletter focused on mathematics. This issue highlights science. Recently released national tests show that California needs an increased emphasis on science in the classroom. The 2000 National Assessment of Educational Progress (NAEP) revealed that California's fourth and eighth graders did not perform as well in science as students in most other states. The fourth grade NAEP tests measure conceptual understanding, scientific investigation and practical reasoning in the fields of earth, physical and life science. Delaine Eastin, State Superintendent of Public Instruction, commented on these scores, "I'm concerned that the subject of science has not received the attention in our schools as have reading and math, especially in grades two through eight." Recognizing the need for increased emphasis on science at the elementary level, beginning in spring 2003, items will be field tested for the new California Science Standards Test. This test, to be administered in grade 5, will assess the science content standards in grades 4 and 5.

This newsletter includes information on the characteristics of an effective elementary school science program, provides information on science activities in kindergarten and highlights Monte Vista Elementary School as having an exemplary science program.

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Building a Presence for Science in California

California is embarking on a new effort to build a statewide network of classroom science teachers and provide them with science teaching resources and professional development opportunities. **Building a Presence for Science** (<www.nsta.org/bap>) is a project of the National Science Teachers Association (NSTA) with support from the ExxonMobil Foundation. This project is designed to reduce the isolation of classroom teachers of science. A consortium of California science organizations has been funded by the NSTA to implement this project in California. Lead organizations are WestEd, the California Department of Education, California Science Teachers Association, K-12 Alliance, and California Science Project.

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Characteristics of an Effective Science Program

The *Science Content Standards for California Public Schools* (CDE, 1998) and the new *Science Framework* (adopted in February 2002) are designed to ensure that all students have a rich experience in science at every grade. The elementary school science program provides the foundational skills and knowledge students will need in middle school. Students are introduced to facts, concepts, and principles in the physical, life and earth sciences (conceptual knowledge). Students also need to learn essential investigation and experimental skills (process skills) that will continue to be developed through high school.

Educators realize that children develop an understanding of their world prior to their entrance into kindergarten. Teachers build upon this early knowledge to develop a deeper understanding. Therefore, it is important that educators of preschool children provide many hands-on activities to enhance and further their students' understandings of the natural world. *First Class: A Guide for Early Primary Education* (CDE, 1999) and the *Prekindergarten Learning and Development Guidelines* (CDE, 2000) provide examples of science activities for preschool children.

To meet the instructional demands of their students, teachers need high quality instructional materials aligned to the science content standards. These materials must promote the students' understanding of scientific inquiry as well as address the dual nature of science-- conceptual knowledge and procedural skills. The content must be scientifically accurate, and the breadth and depth of the California Science Standards need to be addressed. The State Board of Education has adopted standards-based science instructional materials <www.cde.ca.gov/ci/science.html>. In addition to textbooks and other instructional materials, teachers need to be able to gain access to current resources in the school library-media center that support the teaching of standards-based science.

A significant element of an effective elementary science program is the quality of instruction. Multiple instructional strategies, including direct

instruction, teacher modeling and demonstration, investigation, and experimentation are useful in teaching science. Instruction is designed and sequenced to provide students opportunities to reinforce foundational skills and knowledge and to revisit concepts, principles, and theories previously taught. Teachers adapt and select various instructional strategies based upon the science concepts under study and the specific needs of their students. Elementary school students respond positively to well-structured hands-on activities and expository reading materials that connect the world around them to the science content. Teaching science using technology is important for preparing students simultaneously to be scientifically and technologically literate.

The *Science Safety Handbook for California Public Schools* (1999) describes safe practices for conducting demonstrations, hands-on activities, laboratories, and science projects. Knowing and following safe practices in science is part of understanding the nature of science and scientific procedures.

Successful science programs assess students' knowledge and understanding on a continuing basis and make appropriate adjustments during the year. Teachers assess students' prerequisite knowledge, monitor their progress, and determine if the students have mastered the knowledge and skills outlined in the standards. Teachers collaborate to build on successful methods for teaching the science standards.

A quality professional development program is essential because few elementary teachers possess a strong background in science and even fewer have a science degree. Effective professional development opportunities focus on understanding the science content, the processes of science, and instructional strategies proven to be effective.

Teachers should not overlook community resources, such as science and children's museums, zoos and nature centers, local businesses, health services, as well as colleges and universities, to enhance and extend learning experiences. ■

Science Resources for Parents and Families



As adults guiding children through learning experiences, either as parents or teachers, we must keep foremost in our minds that, "What we want our young people to remember is the 'science way' of thinking because they will forget many of the details."

—Leon Lederman
1988 Nobel Prize for Physics

Parent-family involvement is an important predictor of student achievement and success. This is especially true in science education. According to a National Science Foundation Study, more than half the scientists with Ph.D.'s say that they first developed an interest in science between the ages of 5 and 10. Forty-five percent of those surveyed report that either a teacher or parent influenced that decision.

Young children are natural scientists. They are curious and daring—two traits that go hand-in-hand with scientific exploration. Parents can nurture that inquisitiveness by helping their children develop an aptitude and a passion for lifelong science learning.

Parents do not have to be scientists to help their children in science. Being "scientific" means being curious, observing, asking how things happen, and learning how to find answers. Parents who are willing to observe closely, have a positive attitude about science, and take the time to answer questions or seek answers from other resources, will be partners with their children in learning science.

Homework time is an ideal opportunity for students to reflect on learning and synthesize their science

understanding. Well-designed homework can bring parents and other adults into a student's community of science learners. Homework can provide opportunities for long-term projects. For example, students can spend months observing an ecosystem, identifying the geology of the region, finding the names of organisms in an environment, suggesting ways to maintain diversity in that environment, interviewing wildlife managers and perhaps even taking action to protect the environment. Observing the night sky on one night may be interesting, but when students keep a night sky journal for six months—drawing diagrams, tracing movements, and identifying objects in the sky—their learning will be enriched.

The above information was adapted from *EDThoughts, What We Know About Science Teaching and Learning*, published by Mid-continent Research for Education and Learning (McREL).

Additional Resources

The California Science Teachers Association carries *Helping Your Child Learn Science*, available in both English and Spanish, <<http://www.cascience.org/helping.html>>. ■

Kindergarten Association Develops Science Activities

The California science standards serve as a beacon to ensure all children have the opportunity to explore and discover scientific knowledge and procedures. The California Kindergarten Association (CKA) has developed a document that presents a wide range of activities and learning strategies for each strand of the science standards, an example of which is printed below. The complete science document and similar ones addressing mathematics, language arts, history-social studies, and visual and performing arts standards are available at CKA. To obtain copies, contact the CKA office at (916) 780-5331; email at cka@ckanet.org; web site at <www.ckanet.org>. A selected section of the science document follows:

Kindergarten Physical Sciences Standards

1. Properties of materials can be observed, measured, and predicted. As a basis for understanding this concept:

- b. Students know water can be a liquid or a solid and can be made to change back and forth from one form to the other.

States of Matter

Day 1

Ask students to scoop a specific amount of water from a container and pour it into a transparent, recloseable bag. Have them explore the water in the bag and dictate their observations. Record observations on a class chart. Have students place their labeled bags of water in a freezer for an extended period of time to freeze the water.

Day 2

Have students observe the frozen water inside the bags. Ask them to dictate their observations and record on the class chart. Discuss the similarities and differences in the water and the ice.

Day 3

Allow the ice to melt inside the same bags in a location the students can observe the melting. Once all the ice is melted, discuss their observations. Compare these observations to those listed on the class chart. ■

BEST PRACTICES SCHOOL

Monte Vista Elementary School

Monte Vista Elementary School in Vista Unified School District is a high performing school that exemplifies best practices in science. This multi-track, year-round school serves a diverse population. Of the 682 students, 27 percent are English learners, 37 percent qualify for free or reduced-price lunch, and 42 percent are Hispanic.

Science is a high priority at Monte Vista School. Principal Cheryl Vinson supports the teaching of science and its integration into other content areas. Monte Vista has two teachers (a primary and an intermediate) who serve on the district's science committee. This committee, made up of representatives from all K-12 schools, meets regularly with the district science representative. Science information from state, county, and local areas is brought back to Monte Vista and shared at grade level and staff meetings.

The District Science Leadership Team created the district science content matrix based on the California Science Standards. The matrix identifies the unifying concepts and subconcepts to be taught at each grade level. Science kits are then chosen to support the instruction of the standards. Delta's Full Option Science System (FOSS) and the National Science Resource Center's Science and Technology for Children program (STC) have been adopted districtwide. FOSS was chosen to provide in-depth understanding, knowledge, and awareness to support the science standards.

Science kits are stored at the district's Science Resource Center which is staffed by a certificated teacher and a part-time assistant. Fully stocked kits are delivered to school sites when they are needed. Kits also include enough blackline master lab sheets and science journals for each student in the class. When the teacher is finished with the unit, it is picked up from the site and taken back to the resource center where it is refurbished for the next teacher.

For the last two years, all Monte Vista teachers have spent two staff development days working with the kits prior to implementing them in the classroom. These days include content, pedagogy and literacy strategies and are facilitated by the lead teachers.

The amount of instructional time devoted to science varies from teacher to teacher and depends on the grade level taught. The lessons contained in the kits generally are taught three days a week for approximately 40 minutes. It is important to note that embedding literacy strategies into the science time has allowed teachers to meet reading/language arts standards while having students involved in active, hands-on science education.

Teachers at Monte Vista participate in professional development to increase their content background in science and to learn new instructional and assessment strategies. This school participates in the K-12 Alliance Long-Term Program to improve science instruction and implementation of science standards. (For more information, go to <www.k12alliance.net>.) In this statewide

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Monte Vista School (YR, K-5)
Vista Unified School District
Cheryl Vinson, Principal, (760) 726-0410
<cvinson@vusd.k12.ca.us>

Enrollment:	748
White:	51%
Hispanic:	42%
African American:	2%
Other:	5%
English Language Learners:	27%
Free/Reduced Price Lunch:	37%
Fully Credentialed Teachers:	98%
2001 API:	732
Statewide Rank:	7
Similar Schools Rank:	7

Building a Presence (Cont.)

The California objectives of the program are to:

- Enlist at least one *point of contact* for science education in each school throughout the state. (A *point of contact* is a classroom teacher who is an advocate and contact person for science in his or her individual school building.
- Establish a statewide network of approximately 300 *key leaders* who are interested in serving in a leadership position to further science education in the K-12 system.
- Provide resources and professional development for the *key leaders* and *points of contact*.

The California launch of this multi-year project will occur on March 27, 2002, at NTSA's conference in San Diego.

For more information on the **California Building a Presence for Science Program**, see the web site at <www.cascience.org/cabap>. If you're interested in serving either as a *key leader* or a *point of contact*, please contact Deborah Tucker via email at dtucker@cde.ca.gov. A school can have more than one *point of contact*. ■

Monte Vista Elementary School (Cont.)

program, lead teachers are offered opportunities to enhance their own content background, learn science instructional strategies, and make sure the curriculum is accessible by all students in the classroom.

Monte Vista teachers also participate in Teaching-Learning Collaborative (TLC), a unique feature of the K-12 Alliance. This strategy involves teacher reflection on student work and best practices by using a study group focusing on lesson design and assessment. Teams of grade-level teachers collaborate in lesson planning, teaching, and reflection.

In January 2002, Vista USD held a districtwide community science night. Science standards, the importance of teaching conceptual science in K-5, and the importance of community support were discussed. Participants then attended grade-level breakout sessions where students walked them through science activities and shared their work. Approximately 200 parents and community/business leaders attended.

Besides being a K-12 Alliance district for the past 12 years, the Vista Unified School District has created other partnerships which provide science expertise and support. Hewlett Packard partnered with the district in order to provide seed money for the development of the kit-based science program. Through the San Diego County Office of Education graduate students in science from San Diego State University and California State University, San Marcos are sent into classrooms to work with students and teachers by offering content knowledge and background in specific science content areas. This is a "win/win" situation—classrooms get experts in science content and the scientists get a feel for what science education in the elementary grades looks like. ■

Science Web Sites

www.cde.ca.gov/ci/science.html

Your first stop for science on the CDE's web site. Bookmark it! It contains links to the California Standards and Framework, professional development programs, and much more.

www.creec.org

Everything you've wanted to know about environmental education in California. Find your region and what's going on.

www.clrn.org/science

This site contains reviews of electronic learning resources that are linked to the California standards.

www.cascience.org/cabap

Web site for the California Building a Presence for Science Program.

www.enc.org

The Eisenhower National Clearinghouse for Mathematics and Science Education contains links to science programs and curriculum; the free quarterly *Focus* magazine is available here.

www.mcrel.org/resources/links/science

Mid-continent Research for Education and Learning (McREL) provides products and services for K-12 educators to promote the best instructional practices in the classroom. Search for lesson plans, activities, and educational resources by content areas. Contains links to other pertinent educator resources.

www.jason.org

Learn how your school can interact with the Jason program, participate in the Jason expeditions, and take advantage of professional development academy.

www.globe.gov

Globe links students, teachers, and the scientific research community in an effort to learn more about our environment through student data collection and observation. ■